

---

# Monitoring the slowly deforming subduction to collision transition zone in the Balkans : the ALBA project.

Marianne Métois<sup>\*1</sup>, Mouna Benjelloun<sup>2</sup>, Cecile Lasserre<sup>2</sup>, Raphaël Grandin<sup>3</sup>, François Jouanne<sup>4</sup>, Riccardo Vassallo<sup>5</sup>, Rexhep Koçi<sup>6</sup>, Neki Kuka<sup>6</sup>, and Edmond Dushi<sup>6</sup>

<sup>1</sup>Laboratoire de Géologie de Lyon - Terre, Planètes, Environnement [Lyon] (LGL-TPE) – École Normale Supérieure - Lyon, Université Claude Bernard Lyon 1, Institut national des sciences de l'Université, Centre National de la Recherche Scientifique : UMR5276, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université – 69364 Lyon cedex 07, France

<sup>2</sup>Laboratoire de Géologie de Lyon - Terre, Planètes, Environnement [Lyon] – École Normale Supérieure - Lyon, Université Claude Bernard Lyon 1, Institut national des sciences de l'Université, Centre National de la Recherche Scientifique : UMR5276, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université, Institut national des sciences de l'Université – 69364 Lyon cedex 07, France

<sup>3</sup>Institut de Physique du Globe de Paris – Institut national des sciences de l'Université, IPG PARIS, Université Paris Diderot - Paris 7, Université de la Réunion, Centre National de la Recherche Scientifique : UMR7154, Institut national des sciences de l'Université – IPGP, 1 rue Jussieu, 75238 Paris cedex 05 ; Université Paris Diderot, Bât. Lamarck A case postale 7011, 75205 Paris CEDEX 13, France

<sup>4</sup>Institut des sciences de la Terre (ISTerre) – Université de Savoie, CNRS : UMR5275 – 73376 Le Bourget du Lac Cedex, France

<sup>5</sup>Institut des sciences de la Terre – Université de Savoie, CNRS : UMR5275 – 73376 Le Bourget du Lac Cedex, France

<sup>6</sup>Institute of Geosciences, Polytechnic University of Tirana – Albania

## Abstract

The Balkan Peninsula is one of the most seismically active region of the European plate, as testified by significant damaging earthquakes in the last centuries. The increasing number of GPS measurements in the Balkan Peninsula over the last decades has brought new insights on the kinematic of the Eurasian plate there, revealing a significant (~5 mm/yr) clockwise rotation motion of the entire region around the Scutari-Pec line in North Albania and a roughly NS shearing across the Albanide mountain belt compatible with the few focal mechanisms available [Jouanne et al. 2012, Métois et al. 2015].

In this context, Albania appears as a transition zone between the active Hellenic subduction

---

\*Speaker

zone to the South and the Dinaride collision belt to the North. Earthquake hazard there is poorly constrained but is certainly one of the highest in Europe with thirteen Mw 6 shallow earthquakes that stroke the country during the 20th century.

In this study we present the preliminary results from the ALBA project aiming at better constraining the strain rates across this transition zone and better identifying the active structures. In particular, we present (i) a refined c- and s-GPS velocity field for the area resulting from a recent measurement and densification field-work of the campaign network, (ii) a preliminary tecto-morphological study of the Karaborum active fault in southern Albania via Pléiades images and field measurements, and (iii) significant (up to 1.5 cm/yr) small scale (tens of km) subsidence of sedimentary basin and operating oil-fields in the external Albanides detected by Sentinel-1 interferograms. We specifically focus on the Patos-Marinze oil-field, the largest onshore field in Europe, where a strong subsidence is observed together with what could be man-induced seismicity associated to the extraction of buried material, in particular fluids. Better understanding the physical processes at play there and the possible relationship between anthropic activities and crustal deformation is a pressing issue for re-assessing the seismic hazard in the area.